

CLAIMS

What is claimed is:

- 1 1. A node configured for communications at multiple levels of security, comprising:
2 a plurality of seedable code generators, wherein each code generator is configured
3 to generate a different set of codes;
4 a plurality of CDMA encoders respectively coupled to the code generators,
5 wherein each CDMA encoder encodes input data using the set of codes generated by the
6 coupled code generator;
7 a plurality of CDMA decoders respectively coupled to each code generator,
8 wherein each CDMA decoder decodes input data using the set of codes generated by the
9 coupled code generator;
10 a node controller coupled to the plurality of encoders, decoders, and code
11 generators, the controller arranged to provide respective input seeds to the code
12 generators, and to provide respective sets of codes from the code generators to paired
13 encoders and decoders; and
14 an interconnect interface coupled to the plurality of encoders and decoders, the
15 interconnect interface arranged to combine encoded data from the encoders into an output
16 signal and transmit the output signal, and for an input signal received by the interconnect
17 interface provide the input signal to each decoder.
- 1 2. The node of claim 1, wherein the controller is further configured to initialize the
2 code generators with respective first seeds and reset each code generator with respective
3 second seeds.
- 1 3. The node of claim 2, wherein the controller is further configured to reset a code
2 generator with a second seed responsive to receipt of the second seed via the interconnect
3 interface and the decoder coupled to the code generator.
4

1 4. The node of claim 2, wherein the controller is further configured to provide a
2 second seed to an encoder for encoding with a previous seed and reset the code generator
3 coupled to the encoder with the second seed.

1 5. The node of claim 1, wherein the interconnect interface is compatible with a ring
2 interconnect.

1 6. The node of claim 1, wherein the interconnect interface is compatible with a bus
2 interconnect.

1 7. The node of claim 1, wherein the interconnect interface is compatible with a start
2 interconnect.

1 8. The node of claim 1, wherein the interconnect interface is compatible with a
2 radio-frequency interconnect.

1 9. The node of claim 1, wherein the interconnect interface is compatible with a free-
2 space optical interconnect.

1 10. The node of claim 1, wherein the controller includes a FIFO buffer having an
2 input port coupled to a code generator and an output port coupled to an encoder and to a
3 decoder.

1 11. The node of claim 1, wherein:
2 each of the plurality of decoders includes an associated set of sub-decoders having
3 respective input ports arranged to receive input encoded data and respective output ports
4 arranged to output decoded data values; and
5 the controller includes,
6 a first cipher translation table having a first input port coupled to a code
7 generator, a second input port arranged to receive an input data value, and an
8 output port coupled to an encoder, the first cipher translation table configured

9 with data values and associated random codes generated by the code generator,
10 wherein the first cipher translation table outputs the random code associated with
11 an input data value; and
12 a second cipher translation table configured with data values and
13 associated random codes identical to the first cipher translation table, the second
14 cipher translation table including a first input port arranged to receive an input
15 data value, wherein the second cipher translation table outputs the random code
16 associated with an input data value via a first output port and provides the each
17 random code to a respective one of the sub-decoders;
18 data selection logic having a first plurality of input ports coupled to the
19 sub-decoders, a second plurality of input ports arranged to receive respective
20 random codes from the second cipher translation table, a code input port coupled
21 to the first output port of the second cipher translation table, and an output port
22 arranged to output a selected decoded data value, wherein the selection logic is
23 arranged to select one of the decoded data values responsive to a match of an
24 associated random code used by a sub-decoder in generating the decoded data
25 value and a random code received on the code input port from the second cipher
26 translation table upon input of the decoded data value at the first input port.

1 12. A communications arrangement, comprising:
2 a plurality of nodes, each node having at least one seedable code generator and at
3 least one node having a plurality of seedable code generators, wherein the code
4 generators of a node are configured to generate different codes, and each code generator
5 of a node has a corresponding code generator in at least one of the other nodes, and
6 corresponding code generators generate equal codes;
7 each node having a respective CDMA encoder coupled to each code generator of
8 the node, wherein each CDMA encoder encodes input data using the code generated by
9 the coupled code generator;
10 each node having a respective CDMA decoder coupled to each code generator of
11 the node, wherein each CDMA decoder decodes input data using the code generated by
12 the coupled code generator;

13 each node having a respective node controller coupled to each encoder, each
14 decoder, and each code generator of the node, the controller configured and arranged to
15 provide an input seed to each code generator, and provide a code from each code
16 generator to an encoder and to a decoder; and
17 each node having a respective interconnect interface coupled to each encoder and
18 decoder of the node, wherein the interconnect interface is configured to combine encoded
19 data from each encoder into an output signal and transmit the output signal, and for an
20 input signal received by the interconnect interface provide the input signal to each
21 decoder of the node.

1 13. A method for inter-node communication, comprising:
2 in a first node having a plurality of seedable code generators, each code generator
3 generating a set of codes different from the set of codes generated by others of the code
4 generators,
5 generating respective sets of codes by the code generators;
6 encoding a plurality of input data sets in parallel in a CDMA format using
7 the sets of codes;
8 combining the encoded data sets into an output signal; and
9 transmitting the output signal;
10 in a second node having a seedable code generator that generates a set of codes
11 equal to a set of codes generated by a first one of the code generators of the first node,
12 generating a first set of codes by the code generator in the second node;
13 receiving the output signal from the first node as an input signal; and
14 decoding the input signal using the first set of codes and generating a
15 received data set;
16 in a third node having a seedable code generator that generates a set of codes
17 equal to a code generated by a second one of the code generators of the first node,
18 generating a second set of codes by the code generator in the third node;
19 receiving the output signal from the first node as an input signal; and
20 decoding the input signal using the second set of codes and generating a
21 received data set.

1 14. The method of claim 13, further comprising:

2 in a fourth node having a first seedable code generator that generates a set of
3 codes equal to a set of codes generated by the first one of the code generators of the first
4 node and a second seedable code generator that generates a set of codes equal to a set of
5 codes generated by the second one of the code generators of the second node,

6 generating a first set of codes by the first code generator in the fourth
7 node;

8 receiving the output signal from the first node as an input signal;

9 decoding the input signal using the first set of codes and generating a first
10 received data set;

11 generating a second set of codes by the second code generator in the
12 fourth node; and

13 decoding the input signal using the second set of codes and generating a
14 second received data set.

1 15. The method of claim 13, further comprising:

2 initializing the plurality of code generators of the first node with respective initial
3 seeds;

4 initializing the code generator in the second node with the initial seed provided to
5 the first one of the code generators in the first node;

6 initializing the code generator in the third node with the initial seed provided to
7 the second one of the code generators in the first node;

8 transmitting a first new seed from the first node to the second node;

9 re-initializing the code generator in the second node with the first new seed;

10 re-initializing the first one of the code generators in the first node with the first
11 new seed;

12 transmitting a second new seed from the first node to the third node;

13 re-initializing the code generator in the third node with the second new seed;

14 re-initializing the first one of the code generators in the first node with the first
15 new seed.

1 16. The method of claim 15, wherein the step of transmitting the first new seed from
2 the first node to the second node is in response to transmission of a selected number of
3 bytes of data.

1 17. The method of claim 15, wherein the step of transmitting the first new seed from
2 the first node to the second node is in response to passage of a selected amount of time.

1 18. The method of claim 13, further comprising:
2 wherein the encoding in the first node includes selecting code values from a first
3 cipher translation table for values of the input data set;
4 wherein the decoding in the second node includes,
5 decoding the input signal into respective decoded data values using each
6 code value from a second cipher translation table; and
7 selecting for output one of the decoded data values using the second cipher
8 translation table.

1 19. A multi-level security communications arrangement for a processing node,
2 comprising:
3 means for generating a plurality of different sets of codes for respective initial
4 seeds;
5 a plurality of CDMA encoders, wherein each CDMA encoder encodes input data
6 using a respective one of the plurality of sets of codes;
7 a plurality of CDMA decoders, wherein each CDMA decoder decodes input data
8 using a respective one of the plurality of sets of codes;
9 means for providing identical seeds to a paired encoder and decoder;
10 means for combining encoded data from each encoder into an output signal and
11 transmitting the output signal;
12 means for providing a received input signal to each decoder; and
13 means, responsive to a re-initialization event, for providing new identical seeds to
14 each paired encoder and decoder.